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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference FO6747PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US04/21682	International filing date (day/month/year) 01 July 2004 (01.07.2004)	Priority date (day/month/year) 02 July 2003 (02.07.2003)
International Patent Classification (IPC) or national classification and IPC IPC(7): G02B 06/26, 42 and US Cl.: 385/45		
Applicant E.I. DU PONT DE NEMOURS AND COMPANY		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>3</u> sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of _____ sheets.</p> <p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand 02 February 2005 (02.02.2005)	Date of completion of this report 21 November 2005 (21.11.2005)	
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/ US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer <i>Rhonda for Reep</i> Frank G. Font Telephone No. (571) 272-1550	

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I. Basis of the report**1. With regard to the elements of the international application:***

- ☒ the international application as originally filed.
- ☒ the description:
pages 1-14 as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.
- ☒ the claims:
pages 15-17 as originally filed
pages NONE, as amended (together with any statement) under Article 19
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.
- ☒ the drawings:
pages 1-6 as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.
- ☐ the sequence listing part of the description:
pages NONE as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/fig NONE

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US04/21682**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)	Claims <u>4,8,9,17,21 and 22</u>	YES
	Claims <u>1-3,5-7,10-16,18-20,23-27</u>	NO
Inventive Step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-27</u>	NO
Industrial Applicability (IA)	Claims <u>1-27</u>	YES
	Claims <u>NONE</u>	NO

2. CITATIONS AND EXPLANATIONS

Claims 1-3, 5-7, 10-16, 18-20, and 23-27 are anticipated by Kim (US 2002/0085791 A1) and therefore lack novelty. Kim teaches a 1x2 planar optical waveguide signal splitter shown in figure 3. The waveguide is in the form of a Y-branch comprising a trunk and two branches conjoined thereto to form a vertex as can clearly be seen in the figure. At least one of the diverging branches includes an electrical resistance heater (14, 15, 17, 20) that is disposed in such a way so that upon activation, the heater will provide a non-uniform heat flux upon at least one of the branches (see paragraphs 24, 29, 32, and 33). As can be seen, the heater cross section can be either uniform (17 and 20) or non-uniform (14 and 15). The heaters are disposed on an outer edge of the branch so that the heat flux effects predominantly the outer edge as can be seen in figure 3. Kim teaches that the vertex can be an angle of 0.2 degrees with falls within the claimed range of 0.05-4 degrees. The waveguide is made from a polymer material (see paragraph 26). The minimum area of the heater occurs where the heater (14 or 15) bends which is located adjacent to the vertex of the waveguide. Kim also teaches a method for splitting the optical signal that uses the splitter discussed above wherein the electric heater is energized so as to create the non-uniform heat flux upon the surface of at least one of the branches. The rise in temperature in the at least one branch results in a change in the relative intensity of the optical signal propagating in the two branches (see paragraph 26, 29, and 32). The rise in temperature is sufficient to effect a digital optical switching function (see paragraph 33). Kim also teaches that the heater can work as a variable optical attenuator (see paragraph 33).

Claims 4 and 17 lack an inventive step as taught by Kim. Kim teaches a splitter and a method of splitting a signal as discussed above in reference to claims 3 and 16. Kim does not explicitly teach that the angle of the vertex is between 0.4 and 1 degree. However, Kim teaches that the angle of the vertex can be increased significantly (see paragraphs 38-44). It would have been obvious to one of ordinary skill in the art at the time of invention to modify the splitter of Kim so as to use an angle between 0.4 and 1 degree since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art.

Claims 8, 9, 21, and 22 lack an inventive step as shown by Kim and Hida et al ("Polymer Waveguide Thermo-optic Switch with Low Electric Power Consumption at 1.3 μm "). Kim teaches a splitter and a method for splitting a signal as discussed above in reference to claims 7 and 16. Kim teaches that the waveguide is made of a polymer but does not teach that the polymer is a polyfluoroacrylate. Hida et al teach a thermo-optic waveguide switch with waveguides made from a polyfluoroacrylate (see section III of Hida et al). It would have been obvious to one of ordinary skill in the art at the time of invention to modify the splitter of Kim by making the waveguides out of a polyfluoroacrylate as taught by Hida et al. Motivation to do this would be that a polyfluoroacrylate material requires less electrical power than other contemporary waveguide materials (see section I of Hida et al).

----- NEW CITATIONS -----

US 2002/0085791 A1 (KIM et al) 4 July 2002, see figure 3, paragraphs 24,26,29,32,33

HIDA et al. Polymer Waveguide Thermo-optic Switch with Low Electric Power Consumption at 1.3 μm . IEEE Photonics Technology Letters, July 1993, Volume 5, No 7, pp 782-784.

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